Technology Innovation Project

Project Brief

TIP 261: Determining and Improving the Energy Intensity of Microwave Sterilization & Pasteurization Technologies

Context

Food processing is a major Pacific Northwest regional industry, and with the support of the Seafood Products Association and other regional partners, there is substantial potential for widespread adoption of an advanced thermal post-packaging food preservation technology for controlling pathogens. Microwave Assisted Thermal Sterilization (MATS™) developed by a team led by Washington State University (WSU) Department of Biological Systems Engineering is such a technology.

Studies have been performed concerning sustainability and environmental impact on emerging technologies in the food industry. Most recently, a study in Europe has shown that microwave technology reduces the environmental impacts of energy demand and CO_2 emissions. Further, the major advantage of microwave sterilization/pasteurization of packaged foods is the elimination of possible post-treatment contamination. Other advantages of microwave sterilization/pasteurization are shorter heat-up time, and dramatically improved food product quality when compared with conventional heating methods.

Description

MATS™ technology has received both U.S. Food and Drug Administration (FDA), and US Department of Agriculture Food Safety and Inspection Services for production of safe foods. Commercialization of the technology is supported by a consortium of eleven food processing and packaging companies nationwide, and the Seattle-based Seafood Products Association (SPA), which has a strong interest in documentation of the relative energy intensity of the MATS™ process versus conventional sterilization and pasteurization processes.

MATS™ reduces processing time by approximately 80 percent compared to conventional preservation methods, and should therefore be less energy intensive However, the comparative energy savings have not yet been systematically assessed. This project involves an assessment of these energy intensities, followed by outreach to the Northwest food processing industry, as well as regional utilities and other industry service providers to share the energy-saving and product enhancement benefits of MATS™ process technology, and to encourage its adoption.

Why It Matters

This project will capitalize on a potentially significant energy savings opportunity that would help BPA achieve the energy savings goals outlined by the Northwest Power and Conservation Council's Sixth Power Plan, which significantly increases the energy savings goal for the industrial sector.

An increase in energy efficiency will reduce energy usage for Northwest food processors and reduce the load on the region's power generation, transmission, and distribution systems. Qualitative and quantitative methods utilized during energy assessments with appropriate controls will aid in the effectiveness of the research, educational and extension activities along with quantifiable benefits to the society in terms of energy savings and enhancements as a whole.

Current WSU research shows microwave energy provides shorter processing time and enhanced quality to food products. Hence, it is clear that there will be direct benefits in reducing the cost of utilizing resources like steam, water, and electricity, plus indirect benefits of better quality food when compared with conventional retort technology currently used by food processors.

Goals and Objectives

The six objectives identified for this project are as follows:

a) Objective 1: Conduct energy assessments of WSU 10 kW & 40 kW MATS™ pilot-scale systems.

b) Objective 2: Conduct energy assessments of small and large industrial-scale conventional caning and pasteurization systems located in Pacific Northwest..

c) Objective 3: Conduct energy assessment of commercial-scale MATS™ system.

d) Objective 4: Develop energy intensity predictive models for MATS™ systems based on experimental and energy assessment data.

e) Objective 5: Use energy models to evaluate and develop optimized design options for industrial microwave sterilization/pasteurization systems.

f) Objective 6: Outreach campaign to Northwest food processors that may have interest in using MATS™ to replace conventional processes.

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Project Start Date: October 1, 2012

Project End Date: September 30, 2015

Reports & References (Optional)

Links (Optional)

Funding

Total Project Cost:	$1,311,147
BPA Share:	$643,302
External Share:	$667,845
BPA FY2013 Budget:	$283,620

For More Information Contact:

BPA Project Manager:
Erin Hope, ethope@bpa.gov

Participating Organizations

Washington State University Department of Biological Systems Engineering – Pullman, WA
Washington State University Energy Program – Olympia, WA
Seafood Products Association – Seattle, WA